



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

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**GRADE 12**

**INFORMATION TECHNOLOGY P2**

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**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 17 pages.**



**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX sections:

SECTION A:	Short Questions	(20)
SECTION B:	Systems Technologies	(25)
SECTION C:	Communication and Network Technologies	(25)
SECTION D:	Data and Information Management	(20)
SECTION E:	Solution Development	(30)
SECTION F:	Integrated Scenario	(30)

2. Read ALL the questions carefully.

3. Answer ALL the questions.

4. The mark allocation generally gives an indication of the number of facts/reasons required.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Write neatly and legibly.



## SECTION A: SHORT QUESTIONS

### QUESTION 1

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 ... is a protocol used to send e-mails from a mail client to a mail server.

- A FTP
- B SMTP
- C HTTP
- D VoIP

(1)

1.1.2 Arrange the following according to the speed of data access, from the fastest to the slowest:

- A CPU cache; VRAM; SSD; RAM; HDD
- B VRAM; CPU cache; RAM; SSD; HDD
- C CPU cache; VRAM; RAM; SSD; HDD
- D CPU cache; RAM; VRAM; SSD; HDD

(1)

1.1.3 An ... is a private network that offers access to employees of a company.

- A internet
- B extranet
- C outsourceNet
- D intranet

(1)

1.1.4 Changing the regional and language settings of a device is part of ...

- A security management.
- B file compression.
- C system configuration.
- D disk clean-up.

(1)

1.1.5 ... is a type of license that is often used in open-source software to allow users to edit, copy and distribute the software.

- A End User License
- B General Public License
- C Creative Commons License
- D Shrink-wrap Licence

(1)







1.1.6 Which ONE of the following is NOT a feature of microblogs?

- A Fast to create and share
- B Typically hosted on social networking platforms
- C Includes content of text format only
- D Posts are immediate and contain a limited number of characters (1)

1.1.7 Malware that remotely takes control of a group of computers without the users' knowledge is known as a ...

- A zombie.
- B DDoS attack.
- C botnet.
- D keylogger. (1)

1.1.8 Which ONE of the following data types is NOT suitable to be used as part of a case statement in Delphi?

- A Char
- B Boolean
- C String
- D Integer (1)

1.1.9 The following TWO variables have been declared in Delphi:

```
sString: String;  
cChar: Char;
```

Which ONE of the following statements will result in an error?

- A cChar := UpCase(cChar);
- B sString := UpCase(sString);
- C sString := UpperCase(cChar);
- D sString := UpperCase(sString); (1)

1.1.10 Which ONE of the following statements will result in TRUE?

- A NOT(TRUE) AND NOT(FALSE)
- B NOT(TRUE OR FALSE)
- C TRUE AND (FALSE OR TRUE)
- D FALSE AND (FALSE AND (TRUE OR FALSE)) (1)



1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 Computer.



- 1.2.1 A sequence of steps used to solve a specific problem or task (1)
- 1.2.2 The practice of good manners when communicating electronically (1)
- 1.2.3 A complete web address for a specific web page or resource (1)
- 1.2.4 Software that facilitates communication between the operating system and hardware devices (1)
- 1.2.5 A widely used website that allows for collaboration, where users can create, edit and link content easily (1)

1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write 'true' or 'false' next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK. Correct the statement if it is false by changing the underlined word/phrase.

**NOTE:**

- Do NOT simply use the word 'NOT' to change the statement.
- NO marks will be awarded if only FALSE is provided as an answer.

- 1.3.1 The function Randomrange(10,12) in Delphi returns a random integer value between 10 and 12, both inclusive. (1)
- 1.3.2 The Linux Ubuntu operating system is commonly used in smartphones. (1)
- 1.3.3 BitTorrent is a peer-to-peer file-sharing protocol. (1)
- 1.3.4 Shareware software is free to use, but may have limited features or may require payment after a trial period. (1)
- 1.3.5 The human-readable code of a program is referred to as machine code. (1)

**TOTAL SECTION A: 20**





## SECTION B: SYSTEMS TECHNOLOGIES

### QUESTION 2

#### SCENARIO

Research on endangered species is underway at one of the wildlife reserves in the country. Rangers and scientists at the reserve rely on effective computer systems and technologies for their daily operations which includes real-time tracking and monitoring of animals, conservation strategies and the prevention of poaching. Security in terms of the safe-keeping of data and authenticated access control is the responsibility of the IT team.

- 2.1 The motherboard is the 'heart' of any computer.
- 2.1.1 State TWO functions of a motherboard. (2)
- 2.1.2 Explain why a bus communication path is slower than a point-to-point communication path on a motherboard. (2)
- 2.1.3 Explain why a GPU will improve the processing performance of a computer system. (2)
- 2.1.4 Compare the role of RAM and VRAM by specifically referring to the function of EACH. (2)
- 2.2 An operating system performs multiple critical functions in a computer system.
- 2.2.1 Process management is one of the functions of an operating system.  
State a necessary hardware requirement of a CPU to enable multi-processing. (1)
- 2.2.2 Virtual memory is managed by the operating system.  
Explain what *virtual memory* is. (2)
- 2.3 The IT team needs to manage data storage.  
Give a term for the process that removes documents that are no longer actively used from the computer's primary storage and stores the documents in a secondary storage space. (1)
- 2.4 Drones and mobile technology are often used to observe migration patterns of the 'Big 5' animals.
- 2.4.1 Apart from drones, suggest ONE other mobile technology that can be used to observe migration patterns. (1)
- 2.4.2 State TWO constraints of using mobile technologies. (2)



2.5 A database dedicated to conservation is used to store critical data on endangered species and can be accessed by authorised users only.

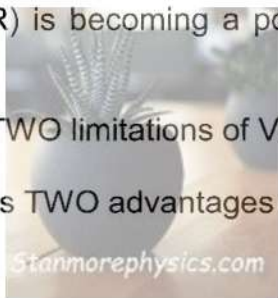


2.5.1 Suggest TWO biometric authentication methods that can be used to gain access to the database. (2)

2.5.2 Use an example to explain the effect of garbage-in-garbage-out (GIGO) in relation to data collection in wildlife tracking systems. (2)

2.5.3 In order to safeguard critical data, state TWO precautions that can be taken to prevent hardware failure. (2)

2.6 Virtual reality (VR) is becoming a powerful tool for wildlife conservation and education.



2.6.1 State TWO limitations of VR technology. (2)

2.6.2 Discuss TWO advantages of using VR for conservation awareness. (2)

**TOTAL SECTION B: 25**



## SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

### QUESTION 3

#### SCENARIO

A luxury lodge in the wildlife reserve wants to upgrade its networking infrastructure. The lodge consists of multiple guest chalets, a main building with a restaurant, reception area, an administration office and a research centre. The lodge provides Wi-Fi access for guests and also has remote surveillance cameras for monitoring wildlife.

3.1 Give TWO reasons why a client-server network will be a suitable network to be used at the lodge. (2)

3.2 Identify the type of area network used in EACH of the following scenarios:

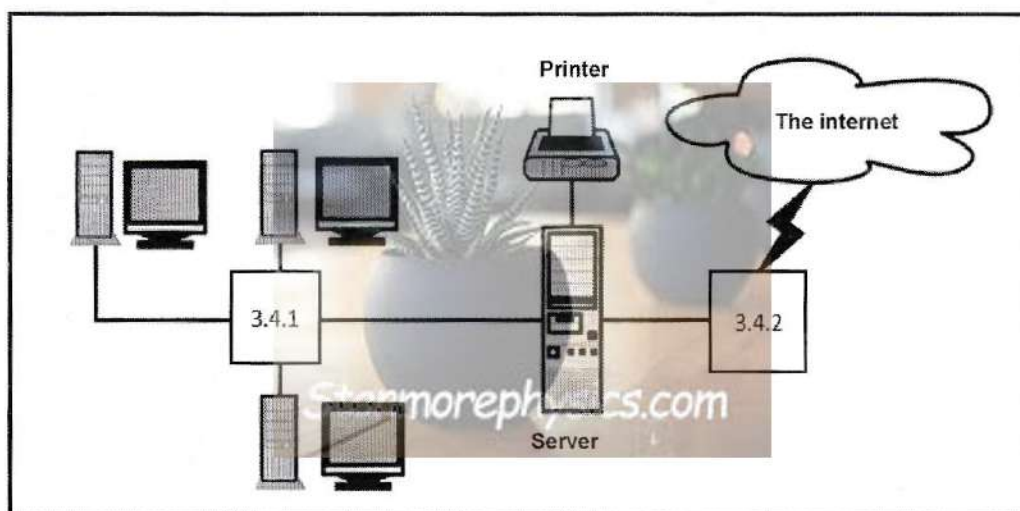
3.2.1 During a safari walk, the same messages that are received on the tour guide's cellphone are accessed on the guide's smartwatch. (1)

3.2.2 The lodge connects to an international wildlife conservation database via the internet. (1)

3.3 The lodge's research centre shares large data files on wildlife with conservationists worldwide.

Apart from saving time and improving efficiency, give TWO other reasons why file transfer protocol (FTP) should be used to share large files. (2)

3.4 The image below shows the network environment in the administrative office.



3.4.1 Identify the device labelled 3.4.1 in the image above. (1)

3.4.2 Identify the device labelled 3.4.2 in the image above. (1)





- 3.5 There is increased bandwidth usage at the lodge due to the large number of guests streaming videos using the wireless network.
- 3.5.1 Differentiate between *range* and *bandwidth* in wireless networks. (2)
- 3.5.2 Give TWO possible reasons why there may be streaming delays and more buffering challenges at the chalets than at the main building where a wired network is used. (2)
- 3.6 The lodge is in the process of upgrading their website from a static website to a dynamic website.
- 3.6.1 Discuss TWO benefits of a dynamic website for the lodge's customers. (2)
- 3.6.2 The web designer has requested for the appointment of a web author at the lodge.
- Name TWO tasks that will typically be allocated to the web author. (2)
- 3.7 Invisible data collection refers to the automatic gathering of user information online, without the user's active awareness.
- 3.7.1 State and explain a technique used in invisible data capturing. (2)
- 3.7.2 How will location-based data, used collectively with invisible data capturing, contribute to the safety of guests at the reserve? (2)
- 3.8 The IT team at the lodge want to improve security when staff log into the reservation system of the lodge remotely.
- 3.8.1 Briefly explain the concept *multi-factor authentication (MFA)*. (1)
- 3.8.2 Motivate why a one-time pin (OTP) is an effective mechanism for verifying staff logins. (1)
- 3.9 The wildlife reserve is setting up a network of motion-activated cameras to monitor rare animals at night. The footage from the cameras must be sent back to the research centre located several kilometres away.
- 3.9.1 Which transmission medium would be the most appropriate to transfer footage from the cameras to the research centre? (1)
- 3.9.2 Give TWO reasons to justify your answer to QUESTION 3.9.1. (2)

**TOTAL SECTION C: 25**



## SECTION D: DATA AND INFORMATION MANAGEMENT

### QUESTION 4

A database has been set up by the management team of the wildlife reserve to save the details of animals, rangers and sightings.

- 4.1 A table called **tblAnimalSightings** has been designed by the management team.

Study the fields and content of the **tblAnimalSightings** table below and answer the questions that follow.

SightingID	RangerName	RangerContact	Experience	Species	Age	SightingLocation	SightingDate	SightingTime
1	John Smith	0821234567	3 years	Lion	7	Zone A	10-Sep-25	8:30
2	Sarah Ndlovu	0849876543	5 years	Elephant	15	Zone B	10-Sep-25	12:45
3	Mike Adams	0835554321	2 years	Cheetah	2	Zone C	11-Sep-25	15:00
4	John Smith	0821234567	3 years	Rhino	4	Zone A	12-Sep-25	9:15
5	Sarah Ndlovu	0849876543	5 years	Elephant	1	Zone B	12-Sep-25	11:30
6	Sarah Ndlovu	0849876543	5 years	Lion	7	Zone B	12-Sep-25	14:30

- 4.1.1 The **Experience** field is currently a text data type.

Give a reason why the data and data type of this field should be changed to integer.

(1)

- 4.1.2 State and explain the anomaly that will occur by having the **RangerContact** and **Experience** fields in the **tblAnimalSightings** table.

(2)

- 4.1.3 The **tblAnimalSightings** table has been split into three separate tables to support normalisation rules.

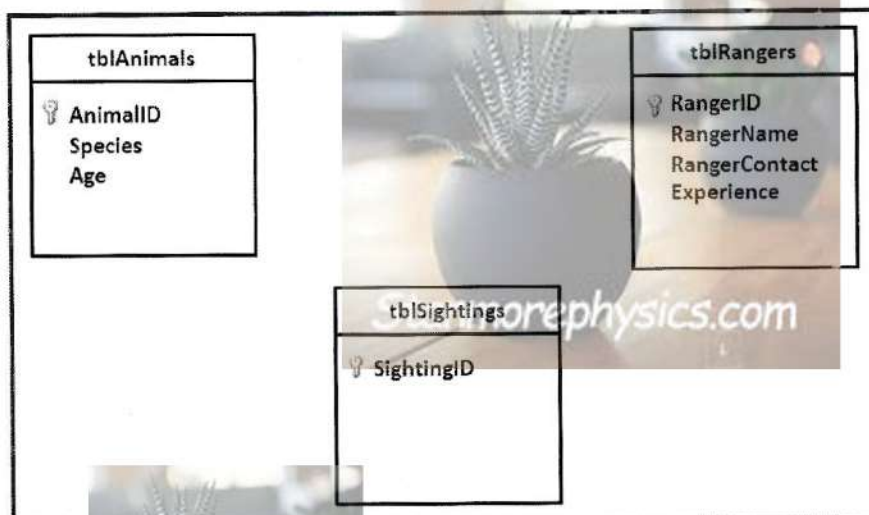
The two tables on the following page, **tblAnimals** and **tblRangers**, have been populated with fields from the original **tblAnimalSightings** table, including relevant primary keys.

Redraw the tables on the following page in your ANSWER BOOK, including the provided fields, and complete the diagram as follows:

- Fill in ALL the missing fields required for the **tblSightings** table, including the foreign key(s).
- Show the relationship(s) between the tables.







(6)

- 4.2 The rangers rely on databases to store vast amounts of data aimed at monitoring the movements of the 'Big 5' animals.

Differentiate between *currency* and *relevance* as characteristics of data.

(2)

- 4.3 Several wildlife reserves across the country use a common booking system. Visitors who have qualified for loyalty cards will receive discounts at certain lodges and national parks.

- 4.3.1 Give TWO potential benefits for a lodge when implementing a guest loyalty card programme.

(2)

- 4.3.2 The lodge does not have the capacity to fund a new proprietary DBMS.

Identify TWO open-source DBMS software applications in the list below.

Microsoft SQL Server; MySQL; Oracle;  
Microsoft Access; PostgreSQL

(2)

- 4.4 The IT team has been instructed to apply data mining techniques on a national data warehouse for the purpose of wildlife conservation.

- 4.4.1 Define the following concepts:

(a) Data warehouse

(2)

(b) Data mining

(2)

- 4.4.2 Give ONE specific example of data mining related to wildlife conservation.

(1)

**TOTAL SECTION D: 20**





**SECTION E: SOLUTION DEVELOPMENT****QUESTION 5**

5.1 Give the value of **iResult** in the following Delphi statements:

5.1.1 `iResult := CEIL (-2.3)` (1)

5.1.2 `iResult := TRUNC (-2.3)` (1)

5.2 The following segment of code has been provided:

```
Line 1    var
Line 2      iNum, iAnsw : Integer;
Line 3      rNum, rAnsw : Real;
Line 4    begin
Line 5      iNum  := 25;
Line 6      rNum  := 15;
Line 7      iAnsw := iNum/5;
Line 8      rAnsw := 15 MOD 3;
Line 9      iAnsw := rNum MOD 3;
Line 10   end;
```

State whether EACH of the following lines of code in the provided segment are CORRECT or INCORRECT. Choose the answer and write 'correct' or 'incorrect' next to the question numbers (5.2.1 to 5.2.3) in the ANSWER BOOK. Give a reason for your answer in each case.

**NOTE:** NO marks will be awarded if only CORRECT or INCORRECT is provided as the answer.

5.2.1 Line 7 (2)

5.2.2 Line 8 (2)

5.2.3 Line 9 (2)



- 5.3 The visitors at the wildlife reserve have an app on their mobile devices to record the sightings of 'Big 5' animals.

The screenshot below is an example of an incomplete application interface to capture data of a single sighting.

**Big 5 - Animal sighting**

**Type of animal**

☐ Buffalo ☐ Rhino ☐ Elephant ☐ Leopard ☐ Lion

**Information about sighting**

Number of animals sighted: 1

Location of sighting: 5.3.2 ?

Date of sighting: 2025/06/12

Time of sighting: 10:41:19 AM

**Record sighting**

**Clear**

- 5.3.1 A **DateTimePicker** component is used to select the date of the sighting in the correct format.

- (a) Name ONE other form of verification that can be applied on the date of the sighting selected. (1)
- (b) Use the example of the date of sighting selected to illustrate the difference between *valid* and *correct* data in this scenario. (2)

- 5.3.2 The possible locations in the reserve where a sighting can be registered are:

Tshokwane, Flamingo Dam, Mopani Camp and Elephant Valley

- Give the name of a suitable component that can be added to the interface to ensure that a valid location is selected by the user. (1)







5.3.3

Design a UML diagram for a **Sighting** object using the information provided on the 'Big 5 - Animal sighting' interface (see previous page).

The following must be included in the UML diagram:

- Five **Sighting** object attributes
- A constructor method without parameters
- Two accessor methods
- One mutator method that receives a parameter
- Private/Public accessibility of all the attributes and methods
- Data types where necessary

(7)

- 5.4 A text file called **BirdSpeciesSpotted.txt** contains the number of bird species spotted by an unknown number of bird watchers over a period of four days. The number of species spotted for the four days will be referred to as SpottedDay1, SpottedDay2, and so on.

The format of each line of text in the text file is as follows:  
 <Name of bird watcher>;<SpottedDay1>#<SpottedDay2>#<SpottedDay3>#<SpottedDay4>

The first THREE lines of text in the text file are shown below:

Jenny Brits;19#8#27#16  
 Mpho Julies;25#33#24#28  
 Vidhi Tyson;16#29#27#38

- 5.4.1 Give ONE reason why a conditional loop will be a suitable loop to read the data from the text file.

(1)

- 5.4.2 The **AssignFile()** and the **Reset()** procedures are used to open a text file for reading purposes.

Which procedure is used to create a new text file following the **AssignFile()** procedure?

(1)

- 5.4.3 The data from the text file **BirdSpeciesSpotted.txt** must be saved into arrays. A one-dimensional array, **arrBirdWatcherNames**, will save the names of the bird watchers and a parallel two-dimensional array, **arr2DSpotted**, will save the number of bird species spotted per day by each bird watcher. The array **arr2DSpotted** will be declared with an additional column which is not currently populated.

- (a) Give ONE reason why the names of the bird watchers should NOT be included as a part of the two-dimensional array **arr2DSpotted**.

(1)







- (b) The table below shows the contents of the first three rows of data in the two-dimensional array **arr2DSpotted**.

19	8	27	16	
25	33	24	28	
16	29	27	38	
...	...	...	...	

A global variable called **iNumBirdWatchers** will store the number of lines read from the text file.

Write an algorithm that can be used to determine the highest number of bird species spotted by each bird watcher over a period of four days, and populate column 5 of the two-dimensional array **arr2DSpotted** with these values. (8)



**TOTAL SECTION E: 30**



**SECTION F: INTEGRATED SCENARIO****QUESTION 6****SCENARIO**

Local and international wildlife researchers often stay at one of the lodges in the reserve, where conferences on wildlife conservation are hosted and strategies on the conservation and protection of wildlife are planned. The lodge has an online booking system and a website with information on research projects, guided safaris and other activities that they offer.

The IT team is responsible for keeping research data and all communication safe, and ensuring that the researchers, rangers and guests have the necessary technologies to support their activities at their disposal.

- 6.1 IPTV is provided as a service for guests at the lodge.
- 6.1.1 Expand the abbreviation *IPTV*. (1)
- 6.1.2 State TWO challenges that are generally experienced by IPTV providers. (2)
- 6.1.3 Compression technologies play a vital role in the transmission of multimedia data.
- Explain the relationship between the video quality and the speed of delivery of compressed video data. (2)
- 6.2 The e-mail system at the lodge was recently targeted by cyber gangs. Users of the system must be educated on aspects of hacking and related vulnerabilities.
- 6.2.1 Explain what *social engineering* is. (2)
- 6.2.2 State TWO ways by which users can identify phishing e-mails. (2)
- 6.2.3 The IT team at the lodge requested for the appointment of a digital forensic investigator.
- Explain the task of a digital forensic investigator. (2)
- 6.3 Researchers will be provided with a security token when using an online booking system to manage their accommodation.
- 6.3.1 Describe how a security token works. (3)
- 6.3.2 Explain how the use of SSL will improve website security. (2)



6.4 The lodge wants its website, titled 'Big 5 Safaris in South Africa', to appear at the top of search engine results to maximise the use of Web 3.0 capabilities.



6.4.1 Suggest TWO techniques that may be used to enhance search engine optimisation to improve the website's visibility. (2)

6.4.2 Is the URL below an example of Web 1.0 or Web 3.0?

<https://example.com/services?category=big5&sessionid=221> (1)

6.4.3 Discuss how a semantic search could improve the accuracy of search results. (2)

6.4.4 Briefly explain what the characteristic of a mediated search method is. (1)



6.5 Researchers use a mobile app that allows them to view additional information about animals observed, while looking through the cameras of their mobile devices.

Identify the type of technology that is used by this app. (1)

6.6 The incident where the poisoning of an elephant by poachers resulted in the poisoning of many vultures (birds) was discussed at a strategic planning session to protect wildlife. Many of the poisoned vultures had active RFID tags and could be located timeously by rangers.

6.6.1 Differentiate between a *passive* and an *active RFID tag*, by referring to the power source of each of these types of tags. (2)

6.6.2 Explain how RFID works and how rangers were able to locate the poisoned birds in time. (3)

6.7 The IT team suggested the implementation of distributed computing at the research centre.

Motivate this suggestion by giving TWO reasons why distributed computing would benefit research projects. (2)

**TOTAL SECTION F: 30**  
**GRAND TOTAL: 150**

